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SEISMIC AFTERSHOCK SURVEYS DURING AN ON-SITE INSPECTION OF A CTBT

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Seismic aftershock surveys may focus the search during an On-Site Inspection. Aftershocks represent a residual effect of an underground nuclear explosion and their detection can serve to localize the search area for diagnostics of a nuclear explosion. LLNL has studied the microseismicity following underground nuclear explosions since the late 1970s, and considered complications introduced by both natural and mining seismicity. Underground explosions induce a unique set of aftershocks: many emergent, low frequency events clustered near the working point of the detonation. If the seismic survey occurs within a few weeks of detonation, anomalous clusters of microseismicity can be detected and located by a network within the inspection zone and used to focus the inspection on specific sites. But the aftershock survey must be designed for ML $\leq$ 1. Deployments conducted around and within mining districts show extensive seismicity; however, the majority are impulsive or distinguishable using locations from post-shot seismicity found at NTS. Natural seismicity originating along earthquake faults or in volcanic regions are also distinctive. In Long Valley, for example, swarms of microseismicity are again more impulsive than NTS aftershocks from small explosions and occur along distinct trends which are consistent with their mechanism. Useful characteristics for an aftershock survey include real-time or near real-time processing, a capability for robust and accurate locations using potentially sparse data with emergent events, source characterization based on stress-drop and moment tensors for discrimination of unusual events, recording and archiving of all seismic data, and interactive graphical displays of the analysis and interpretation.

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